English translation of JP6-40318

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Utility model registration claim]
[Claim 1] In the engine-cooling-water heat radiator which consists of a rectification object fastened between the radiator for engine cooling waters, an induced draft fan, and said radiator and fan The blade of the shape of radii of two or more sheets which fastens said rectification object at a radial between an outer ring, an inner ring, and said outer ring and inner ring constitutes. Said blade is a radiator cooling system for induced draft fans characterized by having "0" thru/or the curvilinear configuration made minute for the revolution component of the airstream in a fan's outlet.
[Claim 2] The radiator cooling system for induced draft fans of claim 1 characterized by equalizing wind-speed distribution of a radiator by equipping with a cone in the inner ring of a rectification object.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EXAMPLE

[Example]
The example of the radiator cooling system for induced draft fans applied to below at this design is explained with reference to a drawing. Drawing 1 is the perspective view of a rectification object, and the rectification object 10 fastens the blade 3 of the shape of radii of 20-30 sheets to a radial between the inner circumference of the outer ring 1, and the periphery of an inner ring 2, and equips with a cone 4 in an inner ring 2. Said outer ring 1 has fixed to the shroud 7 through two or more mounting brackets 5 and 6. What is necessary is for there to be especially no constraint in the configuration, dimension, and installation location of said mounting brackets 5 and 6, and just to be able to fix the rectification object 10 to a shroud 7.
[0008]
The mimetic diagram and drawing 3 as which drawing 2 regarded the circumference of a rectification object from the side face are the mimetic diagram having shown superficially the relation between the rectification object in the case of radiating heat in an engine cooling water using an induced draft fan, and a fan. In order to lead the blade 3 of the rectification object 10 to a fan 8, without giving resistance to the airstream absorbed by the core of a radiator 9 by rotation of a fan's 8 blade 8a, it is being fixed to the include angle to which radiator side edge tail 3a becomes perpendicular to the end face of a radiator 9, i.e., the include angle which becomes parallel to center line X-X of a radiator 9 in drawing 3 . The curvilinear configuration of a blade 3 is equipped with "0" thru/or a curvilinear configuration which is made minute for the revolution component of the airstream in a fan's outlet, and is the include angle theta 1 of fan side edge tail 3b and radiator center line X-X to make. For example, it is 50-60 degrees and fan side edge tail 3b is being fixed upward in drawing 3 . A fan's 8 blade 8a is the 50-60-degree angle of torsion theta 2 as opposed to radiator center line X-X. It has and rotates down the drawing. By rotation of blade 8a, the air inhaled from the way outside the radiator 9 passes along the opening of a radiator 9 prepared in parallel with radiator center line X-X, and flows into the rectification object 10. And it progresses along the curved surface of a blade 3, and flows to an engine side by blade 8a.
[0009]
When the above-mentioned rectification object is fastened between a radiator and an induced draft fan, the velocity diagram in a fan inlet becomes like drawing 4 . It sets to this drawing and is w1. Fan inlet relative velocity and c1 Fan inlet absolute velocity and v1 An average wind speed and U are a fan's rotational speed (peripheral speed). Moreover, the velocity diagram in a fan outlet becomes like drawing 5 . It sets to this drawing and is w2. Fan outlet relative velocity and c2 It is fan outlet absolute velocity. It is deltaPfan about a part for a static pressure rise according to a fan when a rectification object is arranged so that the revolution component 1 may be set to "0". If it carries out and air density is set to rho
deltaPfan =1 / 2xrho (w12-w22)
= 1/2xrho {(U+l) 2-U2}
= 1/2xrho (2 Ul+l2) ..... (1)
It becomes. On the other hand, the velocity diagram in the fan inlet when not arranging a rectification object between a radiator and an induced draft fan becomes like drawing 6 . Setting to this drawing, for w1 ', fan inlet relative velocity and c1 ' are fan inlet absolute velocity and v1. And U is the same as that of the case of drawing 4 . Moreover, the velocity diagram in a fan outlet becomes like drawing 7 . In this drawing, fan outlet relative velocity and c2 ' of w2 ' are fan outlet absolute velocity. It is a part for the static pressure rise by the fan deltaP'fan If it carries out, and a revolution component is set to 1 and air density is set to rho deltaP'fan =1 / 2xrho (w1'2-w2'2)
= 1/2xrho {U2-(U-l) 2}
= 1/2xrho (2 Ul-l2) ..... (2)
It becomes. Difference of the above-mentioned (1) formula and (2) types deltaPfan-deltaP'fan =rhol2 > If this rectification object is fastened between 0 therefore a radiator, and an induced draft fan, rather than the case where a rectification object is not fastened, the static pressure by the fan will rise and airflow will increase by static pressure rise. Moreover, wind-speed distribution can be equalized with the cone arranged in the core of a rectification object.

[0010]
If acoustic material is stuck on the blade front face of a rectification object, the noise component in which the flowing airstream has the inside of the duct formed with a shroud and a rectification object is absorbed by said acoustic material, and the noise can be reduced.
[0011]

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem]
In order to attain the above-mentioned purpose, the radiator cooling system for induced draft fans concerning this design In the engine-cooling-water heat radiator which consists of a rectification object fastened between the radiator for engine cooling waters, an induced draft fan, and said radiator and fan The blade of the shape of radii of two or more sheets which fastens said rectification object at a radial between an outer ring, an inner ring, and said outer ring and inner ring constitutes. Said blade shall be equipped with "0" thru/or the curvilinear configuration made minute for the revolution component of the airstream in a fan's outlet. Moreover, it sets to such a radiator cooling system. By equipping with a cone in the inner ring of a rectification object, it decided to equalize wind-speed distribution of a radiator.
[0006]

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]
When the conventional rectification object which arranged the circular fin of two or more sheets in concentric circular is used, there are the following troubles.
(1) Since the sense of the airstream at the time of the inhaled open air coming out of the clearance between the fins of a radiator 9 is obliged to a turn in the clearance between fins like an arrow head B in the inlet-port section of the rectification object 12 to being parallel to parallel, i.e., center line X-X of a radiator, like the arrow head A shown in drawing 8 , the rectification object 12 turns into a resistor to airstream, and airflow falls. In order to make said resistance small, the include angle theta of the circular fin 11 to radiator center line X-X must be made as small as possible, and shaft-orientations die-length L of the rectification object 12 must be enlarged very much. Moreover, if the number of sheets of the circular fin 11 is reduced, the effectiveness which makes wind-speed distribution of a radiator 9 homogeneity will fall.
(2) Although it is necessary to form at least one stay 13 as shown in drawing 9 since the concentric circular circular fin 11 which constitutes the rectification object 12 is fixed to a position, respectively, this stay 13 also serves as a resistor of the flow of air, and causes the fall of airflow. Moreover, the flow of air is also confused.
[0004]
This design was made paying attention to the above-mentioned conventional trouble, and aims at offering the radiator cooling system for induced draft fans which can perform effective heat exchange by attaining equalization of increase of the airflow which passes a radiator, and wind-speed distribution.
[0005]

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Device]
As explained above, while fastening the blade of the radii patagium of two or more sheets between an outer ring and an inner ring at a radial according to this design Since it equipped with the cone into said inner ring, the rectification object was constituted and the revolution component of the airstream of a fan outlet gave "0" thru/or a curvilinear configuration which is made minute to said blade The revolution component of the airstream in a fan outlet can be changed into the static pressure rise by the fan, and increase of airflow is attained. Moreover, wind-speed distribution of a radiator can be equalized with the cone with which it equipped in the inner ring. Thus, increase of airflow and equalization of wind-speed distribution of a radiator can perform heat exchange of an engine cooling water effectively.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art]
In order to radiate heat in the cooling water of the engine carried in the car system construction equipment, the automobile, the generator, etc., a radiator is formed near said engine, and when the airstream generated by the fan who rotates with rotation of an engine passes the core of said radiator, heat is radiated in the engine cooling water which flows down the inside of a core tube. Said fan's periphery was approached, the shroud was attached between the fan and the radiator, and airflow loss of a fan is prevented. And since the velocity distribution of the airstream which passes the core of a radiator is equalized and heat exchange is performed effectively, as shown in drawing 8 and drawing 9 , the radiator cooling system which made the rectification object 12 which arranged the circular fin 11 of two or more sheets in concentric circular intervene between a radiator 9 and an induced draft fan 8 may be used.
[0003]

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application]
This design is related with the radiator cooling system for induced draft fans.
[0002]

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed explanation of a design]
[0001]
[Industrial Application]
This design is related with the radiator cooling system for induced draft fans.
[0002]
[Description of the Prior Art]
In order to radiate heat in the cooling water of the engine carried in the car system construction equipment, the automobile, the generator, etc., a radiator is formed near said engine, and when the airstream generated by the fan who rotates with rotation of an engine passes the core of said radiator, heat is radiated in the engine cooling water which flows down the inside of a core tube. Said fan's periphery was approached, the shroud was attached between the fan and the radiator, and airflow loss of a fan is prevented. And since the velocity distribution of the airstream which passes the core of a radiator is equalized and heat exchange is performed effectively, as shown in drawing 8 and drawing 9 , the radiator cooling system which made the rectification object 12 which arranged the circular fin 11 of two or more sheets in concentric circular intervene between a radiator 9 and an induced draft fan 8 may be used.
[0003]
[Problem(s) to be Solved by the Device]
When the conventional rectification object which arranged the circular fin of two or more sheets in concentric circular is used, there are the following troubles.
(1) Since the sense of the airstream at the time of the inhaled open air coming out of the clearance between the fins of a radiator 9 is obliged to a turn in the clearance between fins like an arrow head B in the inlet-port section of the rectification object 12 to being parallel to parallel, i.e., center line X-X of a radiator, like the arrow head A shown in drawing 8 , the rectification object 12 turns into a resistor to airstream, and airflow falls. In order to make said resistance small, the include angle theta of the circular fin 11 to radiator center line X-X must be made as small as possible, and shaft-orientations die-length L of the rectification object 12 must be enlarged very much. Moreover, if the number of sheets of the circular fin 11 is reduced, the effectiveness which makes wind-speed distribution of a radiator 9 homogeneity will fall.
(2) Although it is necessary to form at least one stay 13 as shown in drawing 9 since the concentric circular circular fin 11 which constitutes the rectification object 12 is fixed to a position, respectively, this stay 13 also serves as a resistor of the flow of air, and causes the fall of airflow. Moreover, the flow of air is also confused.
[0004]
This design was made paying attention to the above-mentioned conventional trouble, and aims at offering the radiator cooling system for induced draft fans which can perform effective heat exchange by attaining equalization of increase of the airflow which passes a radiator, and wind-speed distribution.
[0005]
[Means for Solving the Problem]
In order to attain the above-mentioned purpose, the radiator cooling system for induced draft fans concerning this design In the engine-cooling-water heat radiator which consists of a rectification object fastened between the radiator for engine cooling waters, an induced draft fan, and said radiator and fan The blade of the shape of radii of two or more sheets which fastens said rectification object at a radial between an outer ring, an inner ring, and said outer ring and inner ring constitutes. Said blade shall be equipped with "0" thru/or the curvilinear configuration made minute for the revolution component of the airstream in a fan's outlet. Moreover, it sets to such a radiator cooling system. By equipping with a cone in the inner ring of a rectification object, it decided to equalize wind-speed distribution of a radiator.
[0006]
[Function]
According to the above-mentioned configuration, the blade of an outer ring, an inner ring, and the radii patagium of two or

more sheets constitutes a rectification object. Since it shall have "0" thru/or the curvilinear configuration made minute, the revolution component of airstream [in / for the blade fastened to a radial between an outer ring and an inner ring / a fan's outlet] The revolution component of the airstream in a fan outlet can be changed into the static pressure rise by the fan, and increase of airflow is attained.

Furthermore, wind-speed distribution of a radiator can be equalized by equipping with a cone in the inner ring of said rectification object.

[0007]

[Example]

The example of the radiator cooling system for induced draft fans applied to below at this design is explained with reference to a drawing. Drawing 1 is the perspective view of a rectification object, and the rectification object 10 fastens the blade 3 of the shape of radii of 20-30 sheets to a radial between the inner circumference of the outer ring 1, and the periphery of an inner ring 2, and equips with a cone 4 in an inner ring 2. Said outer ring 1 has fixed to the shroud 7 through two or more mounting brackets 5 and 6. What is necessary is for there to be especially no constraint in the configuration, dimension, and installation location of said mounting brackets 5 and 6, and just to be able to fix the rectification object 10 to a shroud 7.

[0008]

The mimetic diagram and drawing 3 as which drawing 2 regarded the circumference of a rectification object from the side face are the mimetic diagram having shown superficially the relation between the rectification object in the case of radiating heat in an engine cooling water using an induced draft fan, and a fan. In order to lead the blade 3 of the rectification object 10 to a fan 8, without giving resistance to the airstream absorbed by the core of a radiator 9 by rotation of a fan's 8 blade 8a, it is being fixed to the include angle to which radiator side edge tail 3a becomes perpendicular to the end face of a radiator 9, i.e., the include angle which becomes parallel to center line X-X of a radiator 9 in drawing 3 . The curvilinear configuration of a blade 3 is equipped with "0" thru/or a curvilinear configuration which is made minute for the revolution component of the airstream in a fan's outlet, and is the include angle theta 1 of fan side edge tail 3b and radiator center line X-X to make. For example, it is 50-60 degrees and fan side edge tail 3b is being fixed upward in drawing 3 . A fan's 8 blade 8a is the 50-60-degree angle of torsion theta 2 as opposed to radiator center line X-X. It has and rotates down the drawing. By rotation of blade 8a, the air inhaled from the way outside the radiator 9 passes along the opening of a radiator 9 prepared in parallel with radiator center line X-X, and flows into the rectification object 10. And it progresses along the curved surface of a blade 3, and flows to an engine side by blade 8a.

[0009]

When the above-mentioned rectification object is fastened between a radiator and an induced draft fan, the velocity diagram in a fan inlet becomes like drawing 4 . It sets to this drawing and is w1. Fan inlet relative velocity and c1 Fan inlet absolute velocity and v1 An average wind speed and U are a fan's rotational speed (peripheral speed). Moreover, the velocity diagram in a fan outlet becomes like drawing 5 . It sets to this drawing and is w2. Fan outlet relative velocity and c2 It is fan outlet absolute velocity. It is deltaPfan about a part for a static pressure rise according to a fan when a rectification object is arranged so that the revolution component 1 may be set to "0". If it carries out and air density is set to rho

deltaPfan =1 / 2xrho (w12-w22)

= 1/2xrho {(U+l) 2-U2}

= 1/2xrho (2 Ul+l2) ..... (1)

It becomes. On the other hand, the velocity diagram in the fan inlet when not arranging a rectification object between a radiator and an induced draft fan becomes like drawing 6 . Setting to this drawing, for w1 ', fan inlet relative velocity and c1 ' are fan inlet absolute velocity and v1. And U is the same as that of the case of drawing 4 . Moreover, the velocity diagram in a fan outlet becomes like drawing 7 . In this drawing, fan outlet relative velocity and c2 ' of w2 ' are fan outlet absolute velocity. It is a part for the static pressure rise by the fan deltaP'fan If it carries out, and a revolution component is set to l and air density is set to rho deltaP'fan =1 / 2xrho (w1'2-w2'2)

= 1/2xrho {U2-(U-l) 2}

= 1/2xrho (2 Ul-l2) ..... (2)

It becomes. Difference of the above-mentioned (1) formula and (2) types deltaPfan-deltaP'fan =rhol2 > If this rectification object is fastened between 0 therefore a radiator, and an induced draft fan, rather than the case where a rectification object is not fastened, the static pressure by the fan will rise and airflow will increase by static pressure rise. Moreover, wind-speed distribution can be equalized with the cone arranged in the core of a rectification object.

[0010]

If acoustic material is stuck on the blade front face of a rectification object, the noise component in which the flowing airstream has the inside of the duct formed with a shroud and a rectification object is absorbed by said acoustic material, and the noise can be reduced.

[0011]

[Effect of the Device]

As explained above, while fastening the blade of the radii patagium of two or more sheets between an outer ring and an inner ring at a radial according to this design Since it equipped with the cone into said inner ring, the rectification object was constituted and the revolution component of the airstream of a fan outlet gave "0" thru/or a curvilinear configuration which is made minute to said blade The revolution component of the airstream in a fan outlet can be changed into the static pressure rise by the fan, and increase of airflow is attained. Moreover, wind-speed distribution of a radiator can be equalized with the cone with which it equipped in the inner ring. Thus, increase of airflow and equalization of wind-speed distribution of a radiator can perform heat exchange of an engine cooling water effectively.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view of a rectification object.
[Drawing 2] It is the mimetic diagram which looked at a rectification object and its circumference from the side face.
[Drawing 3] It is the mimetic diagram having shown the relation between a rectification object and a fan superficially.
[Drawing 4] It is drawing showing the velocity diagram in the fan inlet at the time of fastening the rectification object by this design between a radiator and an induced draft fan.
[Drawing 5] It is drawing showing the velocity diagram in the fan outlet at the time of fastening the rectification object by this design between a radiator and an induced draft fan.
[Drawing 6] It is drawing showing the velocity diagram in the fan inlet when not arranging a rectification object between a radiator and an induced draft fan.
[Drawing 7] It is drawing showing the velocity diagram in the fan outlet when not arranging a rectification object between a radiator and an induced draft fan.
[Drawing 8] It is the mimetic diagram which looked at the rectification object of the former which arranged the circular fin in concentric circular, and its circumference from the side face.
[Drawing 9] It is the front view of the rectification object which arranged the circular fin in concentric circular.
[Description of Notations]
1 Outer Ring
2 Inner Ring
3 8a Blade
4 Cone
8 Fan
9 Radiator
10 12 Rectification object

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) 公開実用新案公報（Ｕ）　(11)実用新案出願公開番号

実開平6－40318

(43)公開日　平成６年(1994)５月27日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｆ０１Ｐ　11/10		Ｃ　8206－3Ｇ		
		Ｋ　8206－3Ｇ		
Ｆ０４Ｄ　29/44		Ｃ　7314－3Ｈ		
Ｆ２８Ｆ　9/00		Ｚ　9141－3Ｌ		

審査請求　未請求　請求項の数２(全　２　頁)

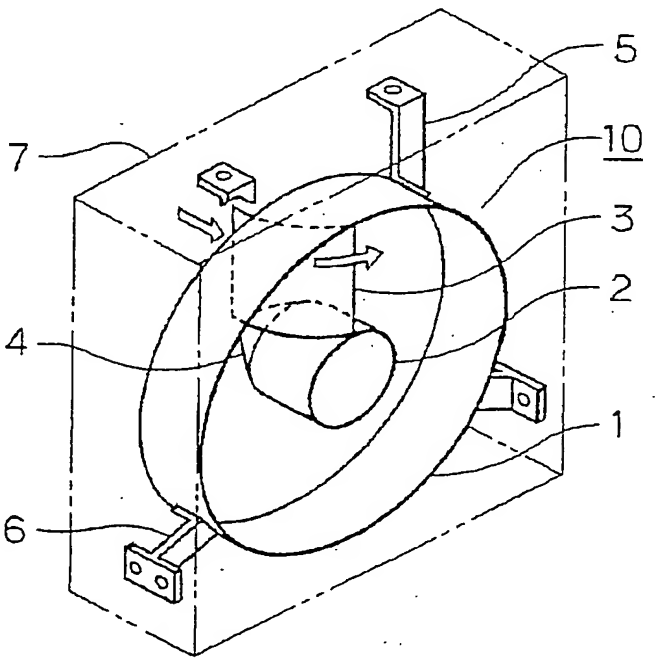
(21)出願番号　実願平4－82754

(22)出願日　平成４年(1992)11月５日

(71)出願人　000001236
株式会社小松製作所
東京都港区赤坂二丁目３番６号
(72)考案者　坪田　晴弘
神奈川県平塚市万田1200　株式会社小松製作所研究所内
(74)代理人　弁理士　橋爪　良彦

(54)【考案の名称】　吸い込みファン用ラジエータ冷却装置

(57)【要約】
【目的】　吸い込みファンを用いたエンジン冷却水放熱装置において、ラジエータを通過する風量の増大ならびに風速分布の均一化を図り、有効な熱交換ができるようにする。
【構成】　アウタリング１とインナリング２との間に複数枚の円弧翼状のブレード３を放射状に挟着して整流体１０を構成する。前記ブレード３は、ファンの回転によってラジエータのコアに吸い込まれた空気流に抵抗を与えずにファンに導くため、ラジエータ側端末部がラジエータに垂直となる角度に固定されている。ブレード３は、ファンの出口における空気流の旋回成分が“０”ないし微小となる曲線形状を有することにより、風量を増大させる。また、インナリング２内に装着したコーン４により、ラジエータの風速分布を均一化させる。



【実用新案登録請求の範囲】

【請求項１】　エンジン冷却水用ラジエータと、吸い込みファンと、前記ラジエータとファンとの間に挟着する整流体とからなるエンジン冷却水放熱装置において、前記整流体をアウタリング、インナリングおよび前記アウタリングとインナリングとの間に放射状に挟着する複数枚の円弧状のブレードによって構成し、前記ブレードはファンの出口における空気流の旋回成分を“０”ないし微小とする曲線形状を備えていることを特徴とする吸い込みファン用ラジエータ冷却装置。

【請求項２】　整流体のインナリング内にコーンを装着することにより、ラジエータの風速分布を均一化したことを特徴とする請求項１の吸い込みファン用ラジエータ冷却装置。

【図面の簡単な説明】

【図１】整流体の斜視図である。

【図２】整流体およびその周辺を側面から見た模式図である。

【図３】整流体とファンとの関係を平面的に示した模式図である。

【図４】本考案による整流体をラジエータと吸い込みファンとの間に挟着した場合の、ファン入口における速度三角形を示す図である。

【図５】本考案による整流体をラジエータと吸い込みファンとの間に挟着した場合の、ファン出口における速度三角形を示す図である。

【図６】ラジエータと吸い込みファンとの間に整流体を配設しない場合の、ファン入口における速度三角形を示す図である。

【図７】ラジエータと吸い込みファンとの間に整流体を配設しない場合の、ファン出口における速度三角形を示す図である。

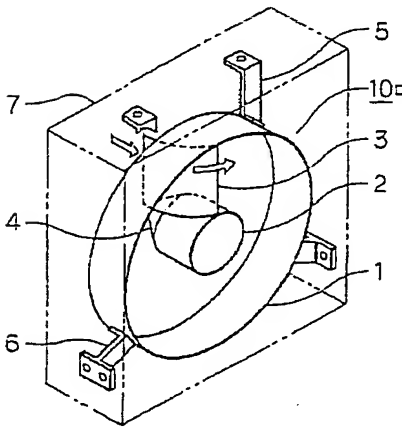
【図８】円形フィンを同心円状に配設した従来の整流体およびその周辺を側面から見た模式図である。

【図９】円形フィンを同心円状に配設した整流体の正面図である。

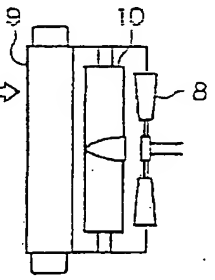
【符号の説明】

１　アウタリング
２　インナリング
３，８ａ　ブレード
４　コーン
８　ファン
９　ラジエータ
１０，１２　整流体

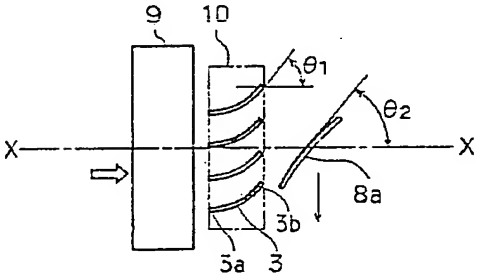
【図１】



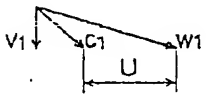
【図２】



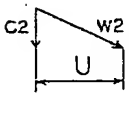
【図３】



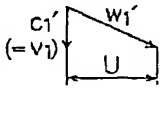
【図４】



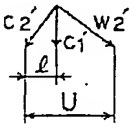
【図５】



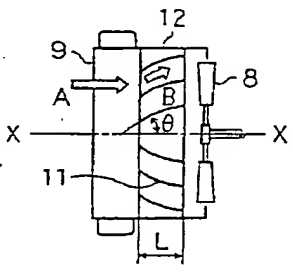
【図６】



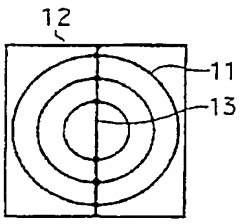
【図７】



【図８】



【図９】



【考案の詳細な説明】

【０００１】

【産業上の利用分野】

本考案は、吸い込みファン用ラジエータ冷却装置に関する。

【０００２】

【従来の技術】

車両系建設機械、自動車、発電機等に搭載したエンジンの冷却水を放熱するため、前記エンジンの近傍にはラジエータが設けられ、エンジンの回転に伴って回転するファンによって発生する空気流が前記ラジエータのコアを通過することによって、コアチューブ内を流下するエンジン冷却水の放熱を行っている。前記ファンの外周に近接してファンとラジエータとの間にシュラウドが取着され、ファンの風量損失を防止している。そして、ラジエータのコアを通過する空気流の流速分布を均一化して熱交換を有効に行うため、図８および図９に示すように、複数枚の円形フィン１１を同心円状に配設した整流体１２をラジエータ９と吸い込みファン８との間に介在させたラジエータ冷却装置を用いることもある。

【０００３】

【考案が解決しようとする課題】

複数枚の円形フィンを同心円状に配設した従来の整流体を用いると、次のような問題点がある。

（１）吸い込まれた外気がラジエータ９のフィンの隙間を出る時点における空気流の向きが、図８に示す矢印Ａのようにフィンの隙間に平行、すなわちラジエータの中心線Ｘ－Ｘに平行であるのに対し、整流体１２の入口部で矢印Ｂのように方向転換を余儀なくされるため、整流体１２が空気流に対する抵抗体となってしまい、風量が低下する。前記抵抗を小さくするためには、ラジエータ中心線Ｘ－Ｘに対する円形フィン１１の角度θをできるだけ小さくし、整流体１２の軸方向長さＬを非常に大きくしなければならない。また、円形フィン１１の枚数を減らすと、ラジエータ９の風速分布を均一にする効果が低下してしまう。

（２）整流体１２を構成している同心円状の円形フィン１１をそれぞれ所定の位置に固定するため、図９に示すように少なくとも１本のステー１３を設ける必要

があるが、このステー１３も空気の流れの抵抗体となり、風量の低下を引き起こす。また、空気の流れも乱れる。

【０００４】

本考案は上記従来の問題点に着目してなされたもので、ラジエータを通過する風量の増大ならびに風速分布の均一化を図ることによって、有効な熱交換ができるような吸い込みファン用ラジエータ冷却装置を提供することを目的としている。

【０００５】

【課題を解決するための手段】

上記目的を達成するため、本考案に係る吸い込みファン用ラジエータ冷却装置は、エンジン冷却水用ラジエータと、吸い込みファンと、前記ラジエータとファンとの間に挟着する整流体とからなるエンジン冷却水放熱装置において、前記整流体をアウタリング、インナリングおよび前記アウタリングとインナリングとの間に放射状に挟着する複数枚の円弧状のブレードによって構成し、前記ブレードはファンの出口における空気流の旋回成分を“０”ないし微小とする曲線形状を備えているものとした。また、このようなラジエータ冷却装置において、

整流体のインナリング内にコーンを装着することにより、ラジエータの風速分布を均一化することにした。

【０００６】

【作用】

上記構成によれば、アウタリング、インナリングおよび複数枚の円弧翼状のブレードによって整流体を構成し、アウタリングとインナリングとの間に放射状に挟着するブレードを、ファンの出口における空気流の旋回成分を“０”ないし微小とする曲線形状を備えているものとしたので、ファン出口における空気流の旋回成分をファンによる静圧上昇に変えることができ、風量の増大が可能となる。更に、前記整流体のインナリング内にコーンを装着することにより、ラジエータの風速分布を均一化することができる。

【０００７】

【実施例】

以下に本考案に係る吸い込みファン用ラジエータ冷却装置の実施例について、図面を参照して説明する。図１は整流体の斜視図で、整流体１０は、アウタリング１の内周とインナリング２の外周との間に２０～３０枚の円弧状のブレード３を放射状に挟着し、インナリング２内にコーン４を装着したものである。前記アウタリング１は、複数の取り付けブラケット５，６を介してシュラウド７に固着されている。前記取り付けブラケット５，６の形状、寸法および取り付け位置には特に制約はなく、シュラウド７に整流体１０を固着することができればよい。

【０００８】

図２は整流体の周辺を側面から見た模式図、図３は吸い込みファンを用いてエンジン冷却水の放熱を行う場合の整流体とファンとの関係を平面的に示した模式図である。整流体１０のブレード３は、ファン８のブレード８ａの回転によってラジエータ９のコアに吸い込まれた空気流に抵抗を与えずにファン８に導くため、ラジエータ側端末部３ａがラジエータ９の端面に対して垂直になる角度、すなわち、図３においてラジエータ９の中心線Ｘ－Ｘに平行になる角度に固定されている。ブレード３の曲線形状は、ファンの出口における空気流の旋回成分を“０”ないし微小とするような曲線形状を備えていて、ファン側端末部３ｂとラジエータ中心線Ｘ－Ｘとのなす角度$\theta 1$はたとえば５０～６０°で、ファン側端末部３ｂは図３において上向きに固定されている。ファン８のブレード８ａは、ラジエータ中心線Ｘ－Ｘに対してたとえば５０～６０°のねじれ角$\theta 2$を有し、図の下方に回転する。ブレード８ａの回転によってラジエータ９の外方から吸い込まれた空気は、ラジエータ中心線Ｘ－Ｘに平行に設けられたラジエータ９の空隙を通り、整流体１０に流入する。そしてブレード３の曲面に沿って進み、ブレード８ａによってエンジン側に流れる。

【０００９】

上記整流体をラジエータと吸い込みファンとの間に挟着した場合、ファン入口における速度三角形は図４のようになる。同図において、w_1はファン入口相対速度、c_1はファン入口絶対速度、v_1は平均風速、Ｕはファンの回転速度（周速）である。また、ファン出口における速度三角形は図５のようになる。同図において、w_2はファン出口相対速度、c_2はファン出口絶対速度である。旋回成

分ｌを“０”とするように整流体を配設した場合、ファンによる静圧上昇分をΔPfan とし、空気密度をρとすると、

$$\Delta Pfan = 1/2 \times \rho (w_1^2 - w_2^2)$$
$$= 1/2 \times \rho \{(U+l)^2 - U^2\}$$
$$= 1/2 \times \rho (2Ul + l^2) \cdots\cdots (1)$$

となる。一方、ラジエータと吸い込みファンとの間に整流体を配設しない場合のファン入口における速度三角形は図６のようになる。同図において、w_1' はファン入口相対速度、c_1' はファン入口絶対速度、v_1 およびＵは図４の場合と同一である。また、ファン出口における速度三角形は図７のようになる。同図において、w_2' はファン出口相対速度、c_2' はファン出口絶対速度である。ファンによる静圧上昇分をΔP′fan とし、旋回成分をｌ、空気密度をρとすると、

$$\Delta P' fan = 1/2 \times \rho (w_1'^2 - w_2'^2)$$
$$= 1/2 \times \rho \{U^2 - (U-l)^2\}$$
$$= 1/2 \times \rho (2Ul - l^2) \cdots\cdots (2)$$

となる。上記（１）式と（２）式との差は、

$$\Delta Pfan - \Delta P' fan = \rho l^2 > 0$$

従って、ラジエータと吸い込みファンとの間に本整流体を挟着すると、整流体を挟着しない場合よりもファンによる静圧が上昇し、静圧上昇分だけ風量が増大する。また、整流体の中心に配設したコーンにより風速分布を均一化することができる。

【００１０】

整流体のブレード表面に吸音材を貼着すれば、シュラウドと整流体とによって形成されるダクト中を流れる空気流がもつ騒音成分が前記吸音材に吸収され、騒音を低減させることができる。

【００１１】

【考案の効果】

以上説明したように本考案によれば、複数枚の円弧翼状のブレードをアウタリング、インナリングの間に放射状に挟着するとともに、前記インナリングの中に

コーンを装着して整流体を構成し、ファン出口の空気流の旋回成分が“０”ないし微小とするような曲線形状を前記ブレードに与えたので、ファン出口における空気流の旋回成分をファンによる静圧上昇に変えることができ、風量の増大が可能となる。また、インナリング内に装着したコーンにより、ラジエータの風速分布を均一化することができる。このように、風量の増大とラジエータの風速分布の均一化とによって、エンジン冷却水の熱交換を有効に行うことができる。